



## Science Department Forensic Science Curriculum

**Developed By:** Nicole Weissert

**Effective Date:** Fall 2019, Revised July 2021 Climate Change

**Standards in Action:** Climate Change Earth's climate is now changing faster than at any point in the history of modern civilization, primarily as a result of human activities. Global climate change has already resulted in a wide range of impacts across New Jersey and in many sectors of its economy. The addition of academic standards that focus on climate change is important so that all students will have a basic understanding of the climate system, including the natural and human-caused factors that affect it. The underpinnings of climate change span across physical, life, as well as Earth and space sciences. The goal is for students to understand climate science as a way to inform decisions that improve quality of life for themselves, their community, and globally and to know how engineering solutions can allow us to mitigate impacts, adapt practices, and build resilient systems. The topic of climate change can easily be integrated into science classes. At each grade level in which systems thinking, managing uncertainty, and building arguments based on multiple lines of data are included, there are opportunities for students to develop essential knowledge and skills that will help them understand the impacts of climate change on humans, animals, and the environment. For example, in the earlier grades, students can use data from first hand investigations of the school-yard habitat to justify recommendations for design improvements to the school-yard habitat for plants, animals, and humans. In the middle grades, students use resources from New Jersey Department of Environmental Protection, the National Oceanic and Atmospheric Administration (NOAA), and National Aeronautics and Space Administration (NASA), to inform their actions as they engage in designing, testing, and modifying an engineered solution to mitigate the impact of climate change on their community. In high school, students can construct models they develop of a proposed solution to mitigate the negative health effects of unusually high summer temperatures resulting from heat islands in cities across the globe and share in the appropriate setting. (NJDOE, Standards Draft Approval, 2020)

Scope and Sequence

UNIT	TIME FRAME	KEY CONCEPTS
1: Introduction to Forensics	3 weeks	<ul style="list-style-type: none"> <li>● History of forensics</li> <li>● Careers in FS</li> <li>● Observation skills</li> <li>● Evidence collection and processing: types, collection of and chain of custody</li> <li>● Locard's principle</li> <li>● Forensic science + the law</li> <li>● Innocence Project</li> </ul>
2: Physical Evidence	6 weeks	<ul style="list-style-type: none"> <li>● Different types of physical evidence</li> <li>● Parts of hair</li> <li>● Structure of the medulla, cortex, and cuticle</li> <li>● Distinguish between human and nonhuman animal hair</li> <li>● Value of hair in forensic investigations</li> <li>● Calculating medullary index</li> <li>● Racial differences in hair</li> <li>● Comparison of crime scene and suspect hair</li> <li>● Identify and describe common weave patterns of textile samples</li> <li>● Compare and contrast various types of fibers through physical and chemical analysis</li> <li>● Example soil samples to link to crime scene</li> <li>● How glass is formed, characteristics and type of glass</li> <li>● Fracture patterns of glass and what that can tell us about a crime scene</li> </ul>

<p>3: Fingerprints and DNA Fingerprinting</p>	<p>4 weeks</p>	<ul style="list-style-type: none"> <li>Analyze the common ridge characteristics of a fingerprint.</li> <li>Identify and compare the three major fingerprint patterns and their respective subclasses.</li> <li>Distinguish between patent, plastic and latent fingerprints</li> <li>Describe the concept of an automated fingerprint identification system (AFIS) and its importance to forensic investigation</li> <li>List and demonstrate the techniques for developing latent fingerprints on porous and nonporous objects.</li> <li>Describe and demonstrate the proper procedures for preserving a developed latent fingerprint.</li> <li>Identify the parts of a nucleotide and explain how nucleotides are linked to form DNA and explain the concept of base pairing as it relates to the double-helix structure of DNA.</li> <li>Describe how the newest DNA typing techniques, like short tandem repeats (STRs) and polymerase chain reaction (PCR) are applied to forensic DNA typing and how CODIS is used to compare DNA samples</li> </ul>
<p>4: Blood and Blood Spatter</p>	<p>5 weeks</p>	<ul style="list-style-type: none"> <li>Explain the composition of blood</li> <li>Describe the function of blood cells</li> <li>Describe the history of the use of blood and blood-spatter analysis in forensic science</li> <li>Describe how to determine blood type, given a sample</li> <li>Describe how to screen for the presence of human blood</li> <li>Calculate the probability of certain blood types within a population</li> <li>Conduct a blood spatter analysis</li> <li>Use blood spatter evidence to recreate the events of a crime scene</li> </ul>
<p>5: Toxicology</p>	<p>3 weeks</p>	<ul style="list-style-type: none"> <li>Identify the 5 types of controlled substances</li> <li>Relate signs and symptoms of an overdose with a specific class of drugs or toxins</li> <li>Describe the goals and practices of toxicology</li> </ul>
<p>6: Handwriting analysis, forgery, and</p>	<p>4 weeks</p>	<ul style="list-style-type: none"> <li>Define questioned document, explain some of the techniques document examiners use to uncover alterations, erasures, obliterations, and variations in pen inks</li> <li>Identify what common characteristics are associated with handwriting and list important guidelines for collecting known writings for comparison to a questioned document.</li> <li>Describe Anti-counterfeiting features on US currency</li> </ul>

counterfeiting		
7: Death - meaning, manner, cause, mechanism, time of death	4 weeks	<ul style="list-style-type: none"> <li>• Distinguish between cause, manner, and mechanisms of death</li> <li>• Distinguish between four manners of death: natural, accidental, suicidal, homicidal</li> <li>• Explain how the development of rigor, algor and livor mortis occur</li> <li>• Describe the stages of decomposition in a corpse</li> <li>• Explain how time of death can be estimated using insect evidence</li> <li>• Describe how various environmental factors may influence the estimated time of death</li> </ul>
8: Forensic Anthropology	3 weeks	<ul style="list-style-type: none"> <li>• Describe how bone is formed</li> <li>• Distinguish between male and female skeletal remains based on skull, jaw, brow ridge, pelvis and femur</li> <li>• Describe how bones contain a record of disease and injury</li> <li>• Describe how age determination may be based upon an analysis of bone</li> <li>• Explain human facial structure differences based upon race</li> <li>• Describe the role of mitochondrial DNA in bone identification</li> </ul>
9: Ballistics	2 weeks	<ul style="list-style-type: none"> <li>• Describe rifling on a gun barrel and how it marks a bullet</li> <li>• Explain barrel size and caliber</li> <li>• Describe how bullets are test fired and matched</li> <li>• Discuss the role of ballistics recovery and examination at a crime scene</li> <li>• Determine the position of the shooter based on bullet trajectory</li> <li>• Describe components of arson and explosives</li> </ul>

<b>Unit 1</b>	
Introduction to Forensics	
<b>Summary and Rationale</b>	
Forensic Science combines the diverse fields of physical and biological sciences to recreate the events surrounding a crime. In this unit students will examine a timeline that details the major contributions to the development of the field of forensic science. Describe the basic as well as specialized services offered by forensic laboratories. Explain proper crime scene procedure and understand the necessity for establishing a chain of custody. Students will be introduced to the field of forensics. They will learn about the history, development, organization, services and functions of the forensic scientist and lab. Students will be introduced to the basics of the crime scene. During this unit, legal considerations at the crime scene will be addressed and the concept of the primary investigation will be covered	
<b>Recommended Pacing</b>	
3 weeks	
<b>Standards</b>	
HS-PS1-2	Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.
HS-PS1-3	Students will plan and conduct investigations into crime scenes and how evidence supports a potential explanation.
HS-PS1-6	Much of science deals with constructing explanations of how things change and how they remain stable.
HS-PS1-7	Scientific Knowledge Assumes an Order and Consistency in Natural Systems Science assumes the universe is a vast single system in which basic laws are consistent.
<b>Interdisciplinary Connections</b>	
WHST.9-12.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
WHST.9-12.5	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
HSN-Q.A.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs

	and data displays - students will draw a crime scene to scale.
RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
WHST.11-12.9	Draw evidence from informational texts to support analysis, reflection and research.
<b>Integration of Technology</b>	
8.1	All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge.
8.2	All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.
<b>Career Readiness, Life Literacies and Key Skills</b>	
9.1.12.CFR.3	Research companies with corporate governance policies supporting the common good and human rights.
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).
9.4.12.CT.3	Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).
9.4.12.GCA.1	Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political, economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).
9.4.12.IML.5	Evaluate, synthesize, and apply information on climate change from various sources appropriately (e.g., 2.1.12.CHSS.6, S.IC.B.4, S.IC.B.6, 8.1.12.DA.1, 6.1.12.GeoHE.14.a, 7.1.AL.PRSNT.2).
9.4.12.IML.6	Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5).
9.4.12.IML.7	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.AL.PRSNT.4).
Online Crime Scene Sketch Tool - <a href="https://www.smartdraw.com/crime-scene/crime-scene-investigation-software.htm">https://www.smartdraw.com/crime-scene/crime-scene-investigation-software.htm</a>	

## Tier 1 Modifications and Accommodations

*Including special education students, Multilingual Language Learners (MLLs), students at risk of school failure, gifted and talented students, and students with 504 plans;*

**Teachers can choose from any of the suggested modifications that follow based upon teaching style, instructional method and needs of individual students.**

### **General Modifications for students struggling to learn:**

- Focus on building relationships in the classroom.
- Control the stressors for the student and manage alternate pathways for completion of assignments.
- Provide feedback utilizing a growth mindset and praise what is done correctly based upon effort, attitude and strategy.
- Boost engagement with material by providing opportunities of differentiation, group work and alternative assignments/assessments where appropriate.

### **MLL**

- Provide additional wait time for student responses to questions to allow students the ability to undergo the process of translation between languages, composition of response and attempted response.
- Simplification of sentence structure and repetition of questions/sentences exactly as stated before trying to rephrase to allow MLL students to hear the sentence and try to comprehend it.
- Rephrase idioms and teach their meanings as when learning a new language, translations are often very literal. IE "Take a stab at it." Ensure students understand what is meant.
- Use directed reading activities. Ensure preview of text before assigned/read, provide pre-reading questions about the main idea and offer help utilizing key words.
- Allow the use of Google Translate where appropriate.
- Utilize bilingual reading texts provided by the STC program.

### **G/T**

Utilize differentiation in the areas of acceleration, enrichment, and grouping. Examples include, but are not limited to:

- interdisciplinary and problem-based assignments with planned scope and sequence
- advance, accelerated, or compacted content
- abstract and advanced higher-level thinking
- allowance for individual student interests
- assignments geared to development in areas of affect, creativity, cognition, and research skills
- complex, in-depth assignments
- diverse enrichment that broadens learning
- variety in types of resources
- internships, mentorships and independent study where applicable

### **504/IEP**

Modifications and accommodations must be aligned to stated plan and uphold expectations of the plan lawfully. Every student requires a different set of accommodations based upon need. Examples specific to science practice include, but are not limited to:

- Note taker or lab assistant
- Group lab assignments
- Use of scribe
- Adjustable tables and lab equipment within reach
- Classrooms, labs and field trips in accessible locations
- Additional time and separate room for test taking
- Additional time for in-class assignments
- Additional time in lab
- Visual and tactile instructional demonstrations
- Computer with voice output, spelling and grammar checker
- Seating in the front of the class
- Tactile drawings and graphs, and three-dimensional models
- Assignments in electronic format
- Large-print handouts, lab signs and equipment labels
- TV monitor connected to microscope to enlarge images

- Computer equipped to enlarge screen characters and images
- Auditory lab warning signals
- Adaptive lab equipment (talking calculators, talking thermometers, light probes, tactile timers)
- Staples on sticks to indicate units of measurement
- Visual warning system for lab emergencies

### Career Readiness, Life Literacies, and Key Skills NJSL

Please select all standards that apply to this unit of study:

- Act as a responsible and contributing citizen and employee.
- Apply appropriate academic and technical skills.
- Attend to personal health and financial well being.
- Communicate clearly and effectively and with reason.
- Consider the environmental social and economics impacts of decisions.
- Demonstrate creativity and innovation.
- Employ valid and reliable research strategies.
- Utilize critical thinking to make sense of problems and persevere in solving them.
- Model integrity, ethical leadership, and effective management.
- Plan education and career paths aligned to personal goals.
- Use technology to enhance productivity.
- Work productively in teams while using cultural global competence.

Suggestions on integrating these standards can be found at: <https://www.nj.gov/education/standards/clicks/>

#### LINKS TO CAREERS:

<https://www.forensicscolleges.com/careers>

## Unit 2

Physical Evidence

### Summary and Rationale

Forensic science utilizes all levels of scientific inquiry, specifically chemistry and physics, to analyze physical evidence with the ultimate goal of recreating the events of the crime for a jury in a court of law. This unit focuses on glass, metal, soil, hair and fiber evidence, its collection and analysis using technology that incorporates core principles from chemistry and physics.

### Recommended Pacing

6 weeks



<b>Standards</b>	
HS-PS4-1	<ul style="list-style-type: none"> <li>- Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.</li> <li>- Empirical evidence is required to differentiate between cause and correlation and make claims about cause and effect.</li> </ul>
HS-PS1-7	Scientific Knowledge Assumes an Order and Consistency in Natural Systems Science assumes the universe is a vast single system in which basic laws are consistent.
HS-PS1-3	Students will plan and conduct investigations into crime scenes and how evidence supports a potential explanation.
<b>Interdisciplinary Connections</b>	
RST.11-12.5	Analyze how the text structures information into categories or hierarchies, demonstrating an understanding of the information or ideas.
RST.11-12.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
RST.11-12.2	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
RST.11-12.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
WHST.11-12.9	Draw evidence from informational texts to support analysis, reflection and research.
<b>Integration of Technology</b>	
8.1	All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge.
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9.1.12.CFR.3	Research companies with corporate governance policies supporting the common good and human rights.
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).

9.4.12.CT.3	Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).
9.4.12.GCA.1	Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political, economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).
9.4.12.IML.5	Evaluate, synthesize, and apply information on climate change from various sources appropriately (e.g., 2.1.12.CHSS.6, S.IC.B.4, S.IC.B.6, 8.1.12.DA.1, 6.1.12.GeoHE.14.a, 7.1.AL.PRSNT.2).
9.4.12.IML.6	Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLA.SL5).
9.4.12.IML.7	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLA.W1, 7.1.AL.PRSNT.4).

### Suggested Resources/Technology Tools

<https://www.sustainablejerseyschools.com/resources/resource-library/climate-change-curriculum/>

#### Hair + Fiber:

[http://www2.msichicago.org/fileadmin/Education/learninglabs/lab\\_downloads/EvidenceLab\\_fibers\\_forensics.pdf](http://www2.msichicago.org/fileadmin/Education/learninglabs/lab_downloads/EvidenceLab_fibers_forensics.pdf)

<http://www.ccmr.cornell.edu/wp-content/uploads/sites/2/2015/11/TraceEvidence.pdf>

#### Soil:

<https://www.crimemuseum.org/crime-library/forensic-investigation/forensic-soil-analysis/>

<https://geology.com/forensic-geology/forensic-geology-laboratory-assignment.pdf>

<https://kenanfellow.org/kfp-cp-sites/ddd/sites/default/files/Soil-Lab.pdf>

#### Glass:

<https://www.crimemuseum.org/crime-library/forensic-investigation/glass-analysis/>

Glass Shatter Lab (TpT)

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**MLL**

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- Communicate clearly and effectively and with reason.

- Consider the environmental social and economics impacts of decisions.
- Demonstrate creativity and innovation.
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- Utilize critical thinking to make sense of problems and persevere in solving them.
- Model integrity, ethical leadership, and effective management.
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**Unit 3**

Fingerprints and DNA Fingerprinting

**Summary and Rationale**

One of the most important uses for fingerprints is to help investigators link one crime scene to another involving the same person. Fingerprint identification also helps investigators to track a criminal's record, their previous arrests and convictions, to aid in sentencing, probation, parole and pardoning decisions. In this unit, students will analyze fingerprints like when they are left at crime scenes to determine how individual each one is. DNA fingerprinting is a relatively new scientific discovery that allows small samples of DNA to be run through tests to test against suspects of a crime. Students will take samples of DNA and run them through these tests to show how the biological matter found at a crime scene can be imperative to solving criminal or mysterious cases.

**Recommended Pacing**

4 weeks

**Standards**

HS-PS2-6	Communicate scientific and technical information about why DNA’s molecular structure is important in the functioning of designed materials.
HS-LS1-1	Construct an explanation based on evidence for how individual DNA evidence can be useful in an ongoing investigation.
HS-LS3-1	Ask questions that arise from examining models or a theory to clarify relationships.

HS-LS3-2	Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.
HS-LS3-3	<ul style="list-style-type: none"> <li>- Technological advances have influenced the progress of science and science has influenced advances in technology.</li> <li>- Science and engineering are influenced by society and society is influenced by science and engineering.</li> </ul>
<b>Interdisciplinary Connections</b>	
RST.11-12.5	Analyze how the text structures information into categories or hierarchies, demonstrating an understanding of the information or ideas.
RST.11-12.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
RST.11-12.2	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
RST.11-12.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text with other sources of information.
WHST.11-12.6	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
WHST.11-12.9	Draw evidence from informational texts to support analysis, reflection and research.
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<https://nj.pbslearningmedia.org/resource/tdc02.sci.life.gen.creatednafingerprint/create-a-dna-fingerprint/>  
[https://www.classzone.com/books/hs/ca/sc/bio\\_07/virtual\\_labs/virtualLabs.html](https://www.classzone.com/books/hs/ca/sc/bio_07/virtual_labs/virtualLabs.html)  
[www.edulastic.com](http://www.edulastic.com)  
[www.quizlet.com](http://www.quizlet.com)  
[www.quizizz.com](http://www.quizizz.com)  
 Google Classroom  
[www.nearpod.com](http://www.nearpod.com)

### Tier 1 Modifications and Accommodations

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- Control the stressors for the student and manage alternate pathways for completion of assignments.
- Provide feedback utilizing a growth mindset and praise what is done correctly based upon effort, attitude and strategy.
- Boost engagement with material by providing opportunities of differentiation, group work and alternative assignments/assessments where appropriate.

#### **MLL**

- Provide additional wait time for student responses to questions to allow students the ability to undergo the process of translation between languages, composition of response and attempted response.
- Simplification of sentence structure and repetition of questions/sentences exactly as stated before trying to rephrase to allow MLL students to hear the sentence and try to comprehend it.
- Rephrase idioms and teach their meanings as when learning a new language, translations are often very literal. IE "Take a stab at it." Ensure students understand what is meant.
- Use directed reading activities. Ensure preview of text before assigned/read, provide pre-reading questions about the main idea and offer help utilizing key words.

- Allow the use of Google Translate where appropriate.
- Utilize bilingual reading texts provided by the STC program.

#### **G/T**

Utilize differentiation in the areas of acceleration, enrichment, and grouping. Examples include, but are not limited to:

- interdisciplinary and problem-based assignments with planned scope and sequence
- advance, accelerated, or compacted content
- abstract and advanced higher-level thinking
- allowance for individual student interests
- assignments geared to development in areas of affect, creativity, cognition, and research skills
- complex, in-depth assignments
- diverse enrichment that broadens learning
- variety in types of resources
- internships, mentorships and independent study where applicable

#### **504/IEP**

Modifications and accommodations must be aligned to stated plan and uphold expectations of the plan lawfully. Every student requires a different set of accommodations based upon need. Examples specific to science practice include, but are not limited to:

- Note taker or lab assistant
- Group lab assignments
- Use of scribe
- Adjustable tables and lab equipment within reach
- Classrooms, labs and field trips in accessible locations
- Additional time and separate room for test taking
- Additional time for in-class assignments
- Additional time in lab
- Visual and tactile instructional demonstrations
- Computer with voice output, spelling and grammar checker
- Seating in the front of the class
- Tactile drawings and graphs, and three-dimensional models
- Assignments in electronic format
- Large-print handouts, lab signs and equipment labels
- TV monitor connected to microscope to enlarge images
- Computer equipped to enlarge screen characters and images
- Auditory lab warning signals
- Adaptive lab equipment (talking calculators, talking thermometers, light probes, tactile timers)
- Staples on sticks to indicate units of measurement
- Visual warning system for lab emergencies

### Career Readiness, Life Literacies, and Key Skills NJSL

*Please select all standards that apply to this unit of study:*

- Act as a responsible and contributing citizen and employee.
- Apply appropriate academic and technical skills.
- Attend to personal health and financial well being.
- Communicate clearly and effectively and with reason.
- Consider the environmental social and economics impacts of decisions.
- Demonstrate creativity and innovation.
- Employ valid and reliable research strategies.
- Utilize critical thinking to make sense of problems and persevere in solving them.
- Model integrity, ethical leadership, and effective management.

- Plan education and career paths aligned to personal goals.
- Use technology to enhance productivity.
- Work productively in teams while using cultural global competence.

Suggestions on integrating these standards can be found at: <https://www.nj.gov/education/standards/clicks/>

*LINKS TO CAREERS:*

<https://www.forensicscolleges.com/careers>

<b>Unit 4</b>	
Blood and Blood Spatter	
<b>Summary and Rationale</b>	
Forensic science utilizes all levels of scientific inquiry, biology, anatomy, serology and human genetics to analyze physical evidence with the ultimate goal of recreating the events of the crime for a jury in a court of law. This unit focuses on biological evidence - specifically blood, its collection and analysis using technology that incorporates core principles from human genetics, serology and anatomy. This unit allows students to look at how blood found at a crime scene can help recreate a scene and ultimately play a major role in solving mysterious crimes.	
<b>Recommended Pacing</b>	
4 weeks	
<b>Standards</b>	
HS-PS2-1	Analyze data to support the claim that Newton’s second law of motion describes the mathematical relationship amount the net force on an object.
HS-LS3-1	Ask questions that arise from examining models or a theory to clarify relationships.
HS-LS3-2	Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.



HS-LS3-3	<ul style="list-style-type: none"> <li>- Technological advances have influenced the progress of science and science has influenced advances in technology.</li> <li>- Science and engineering are influenced by society and society is influenced by science and engineering.</li> </ul>
<b>Interdisciplinary Connections</b>	
RST.11-12.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
RST.11-12.2	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
RST.11-12.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text with other sources of information.
WHST.11-12.6	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
WHST.11-12.9	Draw evidence from informational texts to support analysis, reflection and research.
<b>Integration of Technology</b>	
8.1	All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge.
8.2	All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.
<b>Career Readiness, Life Literacies and Key Skills</b>	
9.1.12.CFR.3	Research companies with corporate governance policies supporting the common good and human rights.
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).
9.4.12.CT.3	Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).

9.4.12.GCA.1	Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political, economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).
9.4.12.IML.5	Evaluate, synthesize, and apply information on climate change from various sources appropriately (e.g., 2.1.12.CHSS.6, S.IC.B.4, S.IC.B.6, 8.1.12.DA.1, 6.1.12.GeoHE.14.a, 7.1.AL.PRSNT.2).
9.4.12.IML.6	Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLA.SL5).
9.4.12.IML.7	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLA.W1, 7.1.AL.PRSNT.4).

<http://www.forensicsciencesimplified.org/blood/principles.html>

<https://www.pbs.org/wgbh/nova/sheppard/>

[https://www.classzone.com/books/hs/ca/sc/bio\\_07/labs.cfm](https://www.classzone.com/books/hs/ca/sc/bio_07/labs.cfm)

- Click on **virtual labs**, then **blood typing**

### Tier 1 Modifications and Accommodations

*Including special education students, Multilingual Language Learners (MLLs), students at risk of school failure, gifted and talented students, and students with 504 plans;*

**Teachers can choose from any of the suggested modifications that follow based upon teaching style, instructional method and needs of individual students.**

#### General Modifications for students struggling to learn:

- Focus on building relationships in the classroom.
- Control the stressors for the student and manage alternate pathways for completion of assignments.
- Provide feedback utilizing a growth mindset and praise what is done correctly based upon effort, attitude and strategy.
- Boost engagement with material by providing opportunities of differentiation, group work and alternative assignments/assessments where appropriate.

#### MLL

- Provide additional wait time for student responses to questions to allow students the ability to undergo the process of translation between languages, composition of response and attempted response.
- Simplification of sentence structure and repetition of questions/sentences exactly as stated before trying to rephrase to allow MLL students to hear the sentence and try to comprehend it.
- Rephrase idioms and teach their meanings as when learning a new language, translations are often very literal. IE "Take a stab at it." Ensure students understand what is meant.
- Use directed reading activities. Ensure preview of text before assigned/read, provide pre-reading questions about the main idea and offer help utilizing key words.
- Allow the use of Google Translate where appropriate.
- Utilize bilingual reading texts provided by the STC program.

#### G/T

Utilize differentiation in the areas of acceleration, enrichment, and grouping. Examples include, but are not limited to:

- interdisciplinary and problem-based assignments with planned scope and sequence
- advance, accelerated, or compacted content
- abstract and advanced higher-level thinking
- allowance for individual student interests
- assignments geared to development in areas of affect, creativity, cognition, and research skills
- complex, in-depth assignments
- diverse enrichment that broadens learning

- variety in types of resources
- internships, mentorships and independent study where applicable

#### 504/IEP

Modifications and accommodations must be aligned to stated plan and uphold expectations of the plan lawfully. Every student requires a different set of accommodations based upon need. Examples specific to science practice include, but are not limited to:

- Note taker or lab assistant
- Group lab assignments
- Use of scribe
- Adjustable tables and lab equipment within reach
- Classrooms, labs and field trips in accessible locations
- Additional time and separate room for test taking
- Additional time for in-class assignments
- Additional time in lab
- Visual and tactile instructional demonstrations
- Computer with voice output, spelling and grammar checker
- Seating in the front of the class
- Tactile drawings and graphs, and three-dimensional models
- Assignments in electronic format
- Large-print handouts, lab signs and equipment labels
- TV monitor connected to microscope to enlarge images
- Computer equipped to enlarge screen characters and images
- Auditory lab warning signals
- Adaptive lab equipment (talking calculators, talking thermometers, light probes, tactile timers)
- Staples on sticks to indicate units of measurement
- Visual warning system for lab emergencies

### Career Readiness, Life Literacies, and Key Skills NJSL

*Please select all standards that apply to this unit of study:*

- Act as a responsible and contributing citizen and employee.
- Apply appropriate academic and technical skills.
- Attend to personal health and financial well being.
- Communicate clearly and effectively and with reason.
- Consider the environmental social and economics impacts of decisions.
- Demonstrate creativity and innovation.
- Employ valid and reliable research strategies.
- Utilize critical thinking to make sense of problems and persevere in solving them.
- Model integrity, ethical leadership, and effective management.
- Plan education and career paths aligned to personal goals.
- Use technology to enhance productivity.
- Work productively in teams while using cultural global competence.

Suggestions on integrating these standards can be found at: <https://www.nj.gov/education/standards/clicks/>

#### *LINKS TO CAREERS:*

<https://www.forensicscolleges.com/careers>

## Unit 5

Toxicology

### Summary and Rationale

Forensic science utilizes all levels of scientific inquiry, specifically chemistry, human physiology and biochemistry, to analyze physical evidence with the ultimate goal of recreating the events of the crime for a jury in a court of law. This unit focuses on drugs, toxicology and the chemistry of alcohol, physical evidence collection and analysis using technology that incorporates core principles from chemistry, physics, biochemistry and human physiology.

### Recommended Pacing

3 weeks

### Standards

HS-PS4-3	Evaluate the claims, evidence, and reasoning behind currently accepted explanations or solutions to determine the merits of arguments.
HS-PS4-5	<ul style="list-style-type: none"><li>- Multiple technologies based on the understanding of waves and their interactions with matter are part of everyday experiences in the modern world and in scientific research.</li><li>- Modern civilization depends on major technological systems.</li></ul>
HS-PS1-7	Scientific Knowledge Assumes an Order and Consistency in Natural Systems Science assumes the universe is a vast single system in which basic laws are consistent.
HS-LS3-2	Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.
HS-LS3-3	<ul style="list-style-type: none"><li>- Technological advances have influenced the progress of science and science has influenced advances in technology.</li><li>- Science and engineering are influenced by society and society is influenced by science and engineering.</li></ul>

### Interdisciplinary Connections

RST.11-12.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text with other sources of information.
RST.11-12.10	By the end of grade 12, read and comprehend science/technical texts in grades 11-CCR text

	complexity band independently and proficiently.
WHST.11-12.6	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
WHST.11-12.9	Draw evidence from informational texts to support analysis, reflection and research.
<b>Integration of Technology</b>	
8.1	All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge.
8.2	All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.
<b>Career Readiness, Life Literacies and Key Skills</b>	
9.1.12.CFR.3	Research companies with corporate governance policies supporting the common good and human rights.
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).
9.4.12.CT.3	Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).
9.4.12.GCA.1	Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political, economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).
9.4.12.IML.5	Evaluate, synthesize, and apply information on climate change from various sources appropriately (e.g., 2.1.12.CHSS.6, S.IC.B.4, S.IC.B.6, 8.1.12.DA.1, 6.1.12.GeoHE.14.a, 7.1.AL.PRSNT.2).
9.4.12.IML.6	Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5).
9.4.12.IML.7	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.AL.PRSNT.4).
<a href="http://virtuallabs.nmsu.edu/corn.php">http://virtuallabs.nmsu.edu/corn.php</a> <a href="https://www.youtube.com/watch?v=1DU3R8kkBI8">https://www.youtube.com/watch?v=1DU3R8kkBI8</a>	
<b>Tier 1 Modifications and Accommodations</b>	

*Including special education students, Multilingual Language Learners (MLLs), students at risk of school failure, gifted and talented students, and students with 504 plans;*

**Teachers can choose from any of the suggested modifications that follow based upon teaching style, instructional method and needs of individual students.**

**General Modifications for students struggling to learn:**

- Focus on building relationships in the classroom.
- Control the stressors for the student and manage alternate pathways for completion of assignments.
- Provide feedback utilizing a growth mindset and praise what is done correctly based upon effort, attitude and strategy.
- Boost engagement with material by providing opportunities of differentiation, group work and alternative assignments/assessments where appropriate.

**MLL**

- Provide additional wait time for student responses to questions to allow students the ability to undergo the process of translation between languages, composition of response and attempted response.
- Simplification of sentence structure and repetition of questions/sentences exactly as stated before trying to rephrase to allow MLL students to hear the sentence and try to comprehend it.
- Rephrase idioms and teach their meanings as when learning a new language, translations are often very literal. IE “Take a stab at it.” Ensure students understand what is meant.
- Use directed reading activities. Ensure preview of text before assigned/read, provide pre-reading questions about the main idea and offer help utilizing key words.
- Allow the use of Google Translate where appropriate.
- Utilize bilingual reading texts provided by the STC program.

**G/T**

Utilize differentiation in the areas of acceleration, enrichment, and grouping. Examples include, but are not limited to:

- interdisciplinary and problem-based assignments with planned scope and sequence
- advance, accelerated, or compacted content
- abstract and advanced higher-level thinking
- allowance for individual student interests
- assignments geared to development in areas of affect, creativity, cognition, and research skills
- complex, in-depth assignments
- diverse enrichment that broadens learning
- variety in types of resources
- internships, mentorships and independent study where applicable

**504/IEP**

Modifications and accommodations must be aligned to stated plan and uphold expectations of the plan lawfully. Every student requires a different set of accommodations based upon need. Examples specific to science practice include, but are not limited to:

- Note taker or lab assistant
- Group lab assignments
- Use of scribe
- Adjustable tables and lab equipment within reach
- Classrooms, labs and field trips in accessible locations
- Additional time and separate room for test taking
- Additional time for in-class assignments
- Additional time in lab
- Visual and tactile instructional demonstrations
- Computer with voice output, spelling and grammar checker
- Seating in the front of the class
- Tactile drawings and graphs, and three-dimensional models
- Assignments in electronic format
- Large-print handouts, lab signs and equipment labels
- TV monitor connected to microscope to enlarge images
- Computer equipped to enlarge screen characters and images

- Auditory lab warning signals
- Adaptive lab equipment (talking calculators, talking thermometers, light probes, tactile timers)
- Staples on sticks to indicate units of measurement
- Visual warning system for lab emergencies

### Career Readiness, Life Literacies, and Key Skills NJSL

*Please select all standards that apply to this unit of study:*

- Act as a responsible and contributing citizen and employee.
- Apply appropriate academic and technical skills.
- Attend to personal health and financial well being.
- Communicate clearly and effectively and with reason.
- Consider the environmental social and economics impacts of decisions.
- Demonstrate creativity and innovation.
- Employ valid and reliable research strategies.
- Utilize critical thinking to make sense of problems and persevere in solving them.
- Model integrity, ethical leadership, and effective management.
- Plan education and career paths aligned to personal goals.
- Use technology to enhance productivity.
- Work productively in teams while using cultural global competence.

Suggestions on integrating these standards can be found at: <https://www.nj.gov/education/standards/clicks/>

#### *LINKS TO CAREERS:*

<https://www.forensicscolleges.com/careers>

## Unit 6

Handwriting Analysis, Forgery, and Counterfeiting

### Summary and Rationale

In this unit, students will identify characteristics of questioned documents that are most useful in forensic comparisons and demonstrate procedures used by forensic scientists to process questioned documents. Over the years, there have been many advancements in the laws and technology that protect people about fraud and counterfeit and in this unit students will study these tools to explain the importance of evidence databases available to forensic scientists.

### Recommended Pacing

4 weeks	
<b>Standards</b>	
HS-LS3-1	Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.
HS-LS3-3	<ul style="list-style-type: none"> <li>- Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible.</li> <li>- Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic &amp; environmental factors</li> </ul>
<b>Interdisciplinary Connections</b>	
RST.11-12.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
RST.11-12.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts & topics.
RST.11-12.9	Synthesize information from a range of sources into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
WHST.11-12.9	Draw evidence from informational texts to support analysis, reflection and research.
<b>Integration of Technology</b>	
8.1	All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge.
8.2	All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.
<b>Career Readiness, Life Literacies and Key Skills</b>	
9.1.12.CFR.3	Research companies with corporate governance policies supporting the common good and human rights.
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).



9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).
9.4.12.CT.3	Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).
9.4.12.GCA.1	Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political, economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).
9.4.12.IML.5	Evaluate, synthesize, and apply information on climate change from various sources appropriately (e.g., 2.1.12.CHSS.6, S.IC.B.4, S.IC.B.6, 8.1.12.DA.1, 6.1.12.GeoHE.14.a, 7.1.AL.PRSNT.2).
9.4.12.IML.6	Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5).
9.4.12.IML.7	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.AL.PRSNT.4).

<http://virtuallabs.nmsu.edu/corn.php>  
<https://www.youtube.com/watch?v=1DU3R8kkBI8>  
<http://stem-works.com/subjects/3-forensics/activities/175>

### Tier 1 Modifications and Accommodations

*Including special education students, Multilingual Language Learners (MLLs), students at risk of school failure, gifted and talented students, and students with 504 plans;*

**Teachers can choose from any of the suggested modifications that follow based upon teaching style, instructional method and needs of individual students.**

#### **General Modifications for students struggling to learn:**

- Focus on building relationships in the classroom.
- Control the stressors for the student and manage alternate pathways for completion of assignments.
- Provide feedback utilizing a growth mindset and praise what is done correctly based upon effort, attitude and strategy.
- Boost engagement with material by providing opportunities of differentiation, group work and alternative assignments/assessments where appropriate.

#### **MLL**

- Provide additional wait time for student responses to questions to allow students the ability to undergo the process of translation between languages, composition of response and attempted response.
- Simplification of sentence structure and repetition of questions/sentences exactly as stated before trying to rephrase to allow MLL students to hear the sentence and try to comprehend it.
- Rephrase idioms and teach their meanings as when learning a new language, translations are often very literal. IE "Take a stab at it." Ensure students understand what is meant.
- Use directed reading activities. Ensure preview of text before assigned/read, provide pre-reading questions about the main idea and offer help utilizing key words.
- Allow the use of Google Translate where appropriate.
- Utilize bilingual reading texts provided by the STC program.

#### **G/T**

Utilize differentiation in the areas of acceleration, enrichment, and grouping. Examples include, but are not limited to:

- interdisciplinary and problem-based assignments with planned scope and sequence
- advance, accelerated, or compacted content
- abstract and advanced higher-level thinking
- allowance for individual student interests
- assignments geared to development in areas of affect, creativity, cognition, and research skills
- complex, in-depth assignments
- diverse enrichment that broadens learning
- variety in types of resources
- internships, mentorships and independent study where applicable

#### 504/IEP

Modifications and accommodations must be aligned to stated plan and uphold expectations of the plan lawfully. Every student requires a different set of accommodations based upon need. Examples specific to science practice include, but are not limited to:

- Note taker or lab assistant
- Group lab assignments
- Use of scribe
- Adjustable tables and lab equipment within reach
- Classrooms, labs and field trips in accessible locations
- Additional time and separate room for test taking
- Additional time for in-class assignments
- Additional time in lab
- Visual and tactile instructional demonstrations
- Computer with voice output, spelling and grammar checker
- Seating in the front of the class
- Tactile drawings and graphs, and three-dimensional models
- Assignments in electronic format
- Large-print handouts, lab signs and equipment labels
- TV monitor connected to microscope to enlarge images
- Computer equipped to enlarge screen characters and images
- Auditory lab warning signals
- Adaptive lab equipment (talking calculators, talking thermometers, light probes, tactile timers)
- Staples on sticks to indicate units of measurement
- Visual warning system for lab emergencies

### Career Readiness, Life Literacies, and Key Skills NJSLs

*Please select all standards that apply to this unit of study:*

- Act as a responsible and contributing citizen and employee.
- Apply appropriate academic and technical skills.
- Attend to personal health and financial well being.
- Communicate clearly and effectively and with reason.
- Consider the environmental social and economics impacts of decisions.
- Demonstrate creativity and innovation.
- Employ valid and reliable research strategies.
- Utilize critical thinking to make sense of problems and persevere in solving them.
- Model integrity, ethical leadership, and effective management.
- Plan education and career paths aligned to personal goals.
- Use technology to enhance productivity.
- Work productively in teams while using cultural global competence.

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*LINKS TO CAREERS:*

<https://www.forensicscolleges.com/careers>

**Unit 7**

Death

**Summary and Rationale**

When a death occurs, a physician or medical examiner must fill out a death certificate. In order to properly complete this document, they must determine three things: the cause, the mechanism, and the manner of death. The differences between these are substantial but are often confused with one another. In this unit, students will learn the differences between the three and understand what each of these can tell us about a crime scene. Students will also take this information about the death and help determine crime timeline and time of death as well as different pieces of evidence to look for, such as insect activity, in order to make important determinations about a case.

**Recommended Pacing**

4 weeks

**Standards**

HS-LS1-1

Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, and how these proteins function after the time of death.

HS-LS1-2

Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

**Interdisciplinary Connections**

RST.11-12.1

Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

RST.11-12.2

Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

RST.11-12.3

Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

WHST.11-12.9	Draw evidence from informational texts to support analysis, reflection and research.
<b>Integration of Technology</b>	
8.1	All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge.
8.2	All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.
<b>Career Readiness, Life Literacies and Key Skills</b>	
9.1.12.CFR.3	Research companies with corporate governance policies supporting the common good and human rights.
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
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9.4.12.IML.5	Evaluate, synthesize, and apply information on climate change from various sources appropriately (e.g., 2.1.12.CHSS.6, S.IC.B.4, S.IC.B.6, 8.1.12.DA.1, 6.1.12.GeoHE.14.a, 7.1.AL.PRSNT.2).
9.4.12.IML.6	Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLA.SL5).
9.4.12.IML.7	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLA.W1, 7.1.AL.PRSNT.4).
<a href="https://www.sciencefriday.com/educational-resources/forensic-entomology-body-farm/">https://www.sciencefriday.com/educational-resources/forensic-entomology-body-farm/</a> <a href="https://www.crimemuseum.org/crime-library/forensic-investigation/cause-mechanism-and-manner-of-death/">https://www.crimemuseum.org/crime-library/forensic-investigation/cause-mechanism-and-manner-of-death/</a> <a href="http://www.theforensicteacher.com/Labs_files/picklelabsheets.pdf">http://www.theforensicteacher.com/Labs_files/picklelabsheets.pdf</a>	
<b>Tier 1 Modifications and Accommodations</b> <i>Including special education students, Multilingual Language Learners (MLLs), students at risk of school failure, gifted and talented students, and students with 504 plans;</i>	
<b>Teachers can choose from any of the suggested modifications that follow based upon teaching style, instructional method and needs of individual students.</b>	

**General Modifications for students struggling to learn:**

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- Control the stressors for the student and manage alternate pathways for completion of assignments.
- Provide feedback utilizing a growth mindset and praise what is done correctly based upon effort, attitude and strategy.
- Boost engagement with material by providing opportunities of differentiation, group work and alternative assignments/assessments where appropriate.

**MLL**

- Provide additional wait time for student responses to questions to allow students the ability to undergo the process of translation between languages, composition of response and attempted response.
- Simplification of sentence structure and repetition of questions/sentences exactly as stated before trying to rephrase to allow MLL students to hear the sentence and try to comprehend it.
- Rephrase idioms and teach their meanings as when learning a new language, translations are often very literal. IE "Take a stab at it." Ensure students understand what is meant.
- Use directed reading activities. Ensure preview of text before assigned/read, provide pre-reading questions about the main idea and offer help utilizing key words.
- Allow the use of Google Translate where appropriate.
- Utilize bilingual reading texts provided by the STC program.

**G/T**

Utilize differentiation in the areas of acceleration, enrichment, and grouping. Examples include, but are not limited to:

- interdisciplinary and problem-based assignments with planned scope and sequence
- advance, accelerated, or compacted content
- abstract and advanced higher-level thinking
- allowance for individual student interests
- assignments geared to development in areas of affect, creativity, cognition, and research skills
- complex, in-depth assignments
- diverse enrichment that broadens learning
- variety in types of resources
- internships, mentorships and independent study where applicable

**504/IEP**

Modifications and accommodations must be aligned to stated plan and uphold expectations of the plan lawfully. Every student requires a different set of accommodations based upon need. Examples specific to science practice include, but are not limited to:

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- Group lab assignments
- Use of scribe
- Adjustable tables and lab equipment within reach
- Classrooms, labs and field trips in accessible locations
- Additional time and separate room for test taking
- Additional time for in-class assignments
- Additional time in lab
- Visual and tactile instructional demonstrations
- Computer with voice output, spelling and grammar checker
- Seating in the front of the class
- Tactile drawings and graphs, and three-dimensional models
- Assignments in electronic format
- Large-print handouts, lab signs and equipment labels
- TV monitor connected to microscope to enlarge images
- Computer equipped to enlarge screen characters and images
- Auditory lab warning signals
- Adaptive lab equipment (talking calculators, talking thermometers, light probes, tactile timers)
- Staples on sticks to indicate units of measurement
- Visual warning system for lab emergencies

## Career Readiness, Life Literacies, and Key Skills NJSLS

*Please select all standards that apply to this unit of study:*

- Act as a responsible and contributing citizen and employee.
- Apply appropriate academic and technical skills.
- Attend to personal health and financial well being.
- Communicate clearly and effectively and with reason.
- Consider the environmental social and economics impacts of decisions.
- Demonstrate creativity and innovation.
- Employ valid and reliable research strategies.
- Utilize critical thinking to make sense of problems and persevere in solving them.
- Model integrity, ethical leadership, and effective management.
- Plan education and career paths aligned to personal goals.
- Use technology to enhance productivity.
- Work productively in teams while using cultural global competence.

Suggestions on integrating these standards can be found at: <https://www.nj.gov/education/standards/clicks/>

### *LINKS TO CAREERS:*

<https://www.forensicscolleges.com/careers>

## Unit 8

### Forensic Anthropology

#### **Summary and Rationale**

Forensic Anthropologists play an important role in establishing the cause of death in an investigation. Their knowledge of the human body contributes to the outcome of a death investigation by providing law enforcement agencies with expert answers and conclusions, which ultimately aids in the outcome of any given case. In this unit, students will study the human bones and help determine information about skeletal remains based solely on their bones. These determinations can include race, age, gender, injuries and height.

#### **Recommended Pacing**

3 weeks

<b>Standards</b>	
HS-LS1-1	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells.
HS-LS1-6	Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to aid in the breakdown of the human body.
HS-LS1-7	Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.
<b>Interdisciplinary Connections</b>	
RST.11-12.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
RST.11-12.2	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
RST.11-12.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
WHST.11-12.9	Draw evidence from informational texts to support analysis, reflection and research.
<b>Integration of Technology</b>	
8.1	All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge.
8.2	All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.
<b>Career Readiness, Life Literacies and Key Skills</b>	
9.1.12.CFR.3	Research companies with corporate governance policies supporting the common good and human rights.
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).

9.4.12.CT.3	Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).
9.4.12.GCA.1	Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political, economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).
9.4.12.IML.5	Evaluate, synthesize, and apply information on climate change from various sources appropriately (e.g., 2.1.12.CHSS.6, S.IC.B.4, S.IC.B.6, 8.1.12.DA.1, 6.1.12.GeoHE.14.a, 7.1.AL.PRSNT.2).
9.4.12.IML.6	Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5).
9.4.12.IML.7	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.AL.PRSNT.4).

### Suggested Resources/Technology Tools

<https://www.sustainablejerseyschools.com/resources/resource-library/climate-change-curriculum/>  
[https://forensics.rice.edu/en/materials/activity\\_nine.pdf](https://forensics.rice.edu/en/materials/activity_nine.pdf)  
<https://naturalhistory.si.edu/education/teaching-resources/social-studies/forensic-anthropology>

### Tier 1 Modifications and Accommodations

*Including special education students, Multilingual Language Learners (MLLs), students at risk of school failure, gifted and talented students, and students with 504 plans;*

**Teachers can choose from any of the suggested modifications that follow based upon teaching style, instructional method and needs of individual students.**

#### General Modifications for students struggling to learn:

- Focus on building relationships in the classroom.
- Control the stressors for the student and manage alternate pathways for completion of assignments.
- Provide feedback utilizing a growth mindset and praise what is done correctly based upon effort, attitude and strategy.
- Boost engagement with material by providing opportunities of differentiation, group work and alternative assignments/assessments where appropriate.

#### MLL

- Provide additional wait time for student responses to questions to allow students the ability to undergo the process of translation between languages, composition of response and attempted response.
- Simplification of sentence structure and repetition of questions/sentences exactly as stated before trying to rephrase to allow MLL students to hear the sentence and try to comprehend it.
- Rephrase idioms and teach their meanings as when learning a new language, translations are often very literal. IE "Take a stab at it." Ensure students understand what is meant.
- Use directed reading activities. Ensure preview of text before assigned/read, provide pre-reading questions about the main idea and offer help utilizing key words.
- Allow the use of Google Translate where appropriate.
- Utilize bilingual reading texts provided by the STC program.

#### G/T

Utilize differentiation in the areas of acceleration, enrichment, and grouping. Examples include, but are not limited to:



- interdisciplinary and problem-based assignments with planned scope and sequence
- advance, accelerated, or compacted content
- abstract and advanced higher-level thinking
- allowance for individual student interests
- assignments geared to development in areas of affect, creativity, cognition, and research skills
- complex, in-depth assignments
- diverse enrichment that broadens learning
- variety in types of resources
- internships, mentorships and independent study where applicable

#### 504/IEP

Modifications and accommodations must be aligned to stated plan and uphold expectations of the plan lawfully. Every student requires a different set of accommodations based upon need. Examples specific to science practice include, but are not limited to:

- Note taker or lab assistant
- Group lab assignments
- Use of scribe
- Adjustable tables and lab equipment within reach
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### Career Readiness, Life Literacies, and Key Skills NJSL

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**Unit 9**

Ballistics

**Summary and Rationale**

Ballistics is the area of Forensic Science that deals with firearms; how they are used, why they are used and why they are used frequently in the practice of murder. Ballistics is a very important part of the world of Forensic Science and much of its evidence is used in criminal proceedings. In some cases the use of ballistics research can prove a link between many different crimes carried out over a lengthy period of time. This unit focuses on arson, explosive and ballistic evidence, its collection and analysis using technology that incorporates core principles from chemistry and physics. Students will be identifying patterns, types of guns and using math skills to determine trajectory angles.

**Recommended Pacing**

2 weeks

**Standards**

HS-PS2-1

Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.

HS-PS2-2

Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.

HS-PS2-3

Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.

**Interdisciplinary Connections**

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<https://www.flinnsci.com/bullet-trajectory-analysis/dc11316/>  
[https://s3.amazonaws.com/scschoolfiles/237/bullet\\_trajectory.pdf](https://s3.amazonaws.com/scschoolfiles/237/bullet_trajectory.pdf)  
[http://www.firearmsid.com/A\\_bulletDrifling2.htm](http://www.firearmsid.com/A_bulletDrifling2.htm)  
[https://www.wssu.org/site/handlers/filedownload.ashx?moduleinstanceid=1220&dataid=1241&FileName=Bullet\\_Striations\\_Student\\_Lab.pdf](https://www.wssu.org/site/handlers/filedownload.ashx?moduleinstanceid=1220&dataid=1241&FileName=Bullet_Striations_Student_Lab.pdf)

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